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Modifications to issue 11.05

Technical Data:
- Marking of the standard voltage
- upper limit of the ambient air conditions dependent on the selected condenser
- max. water pressure: 10 bar

Installation:
Pressure line diameter of the CSD/U 301: 22 mm

Maintenance:
Pre-filter: description added

Options:
Steam humidifier: new function of DIP-switch A5-6 and B1
Raised floor stand: description added
Louvers: Description added
Description of the option "Three phase control"
1. Safety

1.1 Regulations
CEE Guide-lines / Standards
- Guide-line for the security of machines (CEE 98/37/EG)
- Low voltage guide-line (CEE 73/23)
- Electromagnetical interference suppression regulation (CEE 89/336)
- Pressure equipment guide-line (CEE 97/23)

<table>
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<th>Standard</th>
<th>Description</th>
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<tr>
<td>EN 378 - T1/T2/T3/T4</td>
<td>Refrigerating systems and heat pumps</td>
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<tr>
<td>EN ISO 12100 - 1/2</td>
<td>Safety of machines</td>
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<td>EN 294</td>
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<td>EN 60204-1</td>
<td>Electrical equipment of machines</td>
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<tr>
<td>EN 61000-6-2</td>
<td>Electromagnetic compatibility, Immunity standard</td>
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</table>

1.2 Marking

- **Danger** - threatening danger, grievous bodily harm and death
- **Attention** - dangerous situation, light bodily injury and material damage
- **Information** - important information and application notice
1.3 Safety instructions

General

These operating instructions contain basic information which is to be complied with for installation, operation and maintenance. They must therefore be read and complied with by the fitter and the responsible trained staff/operators before assembly and commissioning. They must be permanently available at the place where the system is used.

R407C refrigerants are used in STULZ units. Refrigerants are volatile, or highly volatile fluorinated hydrocarbons which are liquefied under pressure. They are incombustible and not hazardous to health when used as intended.

- Works have to be carried out by competent staff only
- Observance of the regulations for accident prevention
- Stay out of danger when lifting and setting off the unit
- Secure the unit to avoid the risk of overturning
- Safety devices may not be bypassed.
- Respect the corresponding VDE-, EN- and IEC standards for the electrical connection of the unit and observe the conditions of the power supply companies
- Switch off the voltage from the unit when working on it.

- Observe the national regulations of the country where the unit will be installed
- The refrigerant circuit contains refrigerant and refrigerating plant oil, observe professional disposal for maintenance and when setting the unit out of service.
- Cooling water additives have an acidic effect on skin and eyes, wear safety glasses and safety gloves
- Observe personal protective equipment when working on the refrigerant circuit.
- The unit may only be used to cool air according to the Stulz specification.

- Respect material compatibility in the whole hydraulic circuit.
- The male triangular wrench is to be placed in a visible location in the immediate vicinity of the unit.

1.4 Handling refrigerants

According to EN 378, refrigerants are divided in groups in respect of health and safety: R407C and R134a belong to Group L1.
- Adherence to the regulations by law and guide-lines
- Execution only by competent staff
- Responsibility for correct disposal of refrigerant and system parts is incumbent on the operator.
- Refrigerants have a narcotic effect when inhaled in high concentrations.
- The room is to be evacuated immediately if high concentrations of refrigerant suddenly occur. The room may only be entered again after adequate ventilation.
- If unavoidable work is required in the presence of a high concentration of refrigerant, breathing apparatus must be worn. This does not mean simple filter masks. Comply with breathing protection data sheet.
- Safety glasses and safety gloves are to be worn.
- Do not eat, drink or smoke at work.
- Liquid refrigerant must not get onto the skin (risk of burns).
- Only use in well ventilated areas.
- Do not inhale refrigerant vapours.
- Warn against intentional misuse.
- It is absolutely essential to comply with the first aid measures if accidents occur.
- Refrigerants containing FCs contribute to the global warming and with this to climate changes. The FCs must therefore be disposed of in accordance with the regulations, i.e. only by companies specially qualified under § 191 of the water resources management law and licensed as recognised disposal companies for refrigerants.

1.5 Safety and environmental requirements

The following requirements relate to the operation of refrigerating plants within the European Community.
- The used components must correspond to the pressure equipment guide-line EC/97/23 and EN 378 part 1-4.
- Independent of the design, the equipment and inspection before the delivery, also the operator of such plants has duties according to EN 378 and national regulations.

This concerns the installation, the operation and the repeated inspection:
- Installation: according to EN 378
- Operation: Determination of emergency measures (accidents, malfunctions)
  Creation of an abbreviated instruction and notification (template page)
  a. A unit protocol must be kept.
  b. To be stored in the proximity of the unit
  c. Access for competent staff in case of repairs and repeated inspection must be ensured.
- Repeated inspection: according to EN 378

The operator is responsible for the execution. The operator must ensure that all maintenance, inspection and assembly work is carried out by authorised and qualified specialist staff who have made an in-depth study of the operating instructions. It is absolutely essential to comply with the procedure for shutting down the system described in the operating instructions. Before maintenance work, the unit must be switched off at the main switch and a warning sign displayed to prevent unintentional switching-on.

First aid measures
- If health problems occur during or after handling fluorinated hydrocarbons, a doctor is to be consulted immediately. The doctor is to be informed that the work involved the use of fluorinated hydrocarbons.
- In the case of acute effects, the casualty is to be brought into the fresh air as quickly as possible.
- The casualty must never to be left unsupervised.
- If the casualty is not breathing, initiate mouth-to-mouth resuscitation immediately.
- If the casualty is unconscious or very dazed he or she must not be given any liquid.
- Splashes of fluorinated hydrocarbons in the eyes can be blown out or fanned out by an assistant. Then rinse with water.

Independent conversion and manufacture of replacement parts
The system may only be converted or modified after consultation with STULZ. Original replacement parts and replacement parts/accessories authorised by STULZ are an aid to safety.

Unacceptable operating methods
The operating safety of the system is only guaranteed when it is used as intended (see operating instructions, page 11). The limit values stipulated in the technical data must not be exceeded under any circumstances.
2. Description

2.1 Type code

The type code represents the unit variant of your A/C unit and can be found on the rating plate.

The rating plate is located in the door in front of the electrical compartment.
**Unit variants**

The different versions of the Compact DX product range are defined by the energy index, the airflow direction, the unit capacity, the number of refrigerant circuits and the way of cooling system.

The units of the Compact DX product range exist in 5 different cabinet sizes with different width, to which specific features adhere as far as the heating and humidifier equipment is concerned.

![Cabinet sizes](image)

**Note:** The cabinet size 5, which is not stated here, is part of the CyberAir product range.

<table>
<thead>
<tr>
<th>Cab. size</th>
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<th>2</th>
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<td>1052</td>
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</tbody>
</table>

**Air flow (D/U)**

A distinction is made between downflow and upflow A/C units in respect of air flow. On downflow units the room air is drawn in to the A/C units from above and passed down into the raised floor void. On upflow units the room air is drawn in from the front side of the A/C unit and passed upwards.

![Downflow](image)

![Upflow](image)
**Number of refrigerant circuits (1/2)**

The Compact DX units exist with either one or two refrigerant circuits. The two-circuit units are equipped with two refrigerant circuits which are nearly identical with the sole exception that only the first circuit contains a dehumidifying circuit. Also the optional suction throttle is only included in the first circuit. The two-circuit G-units are piped in parallel at the water side and contain the same number of components as the single circuit version.

---

**A-system**

The air-cooled (A) direct expansion (DX) system uses refrigerant as the heat transfer medium. Room air re-circulates through the internally mounted CyberAir unit which houses the evaporator coil, scroll compressor and refrigeration system. A remotely mounted air-cooled condenser is connected, by specialist installers, to the room unit via a sealed refrigeration circuit such that the absorbed room heat load can be rejected to atmosphere.

---

**G-system**

The glycol/water cooled (G) version utilises the same refrigeration system as the type-A CyberAir unit and room air re-circulates through an evaporator coil. However an internally mounted plate condenser is then used to transfer the room heat load to a glycol solution. This condenser water acts as a secondary heat transfer medium, which is then pumped to a remotely mounted air-cooled drycooler or cooling tower where the heat is finally rejected to atmosphere. Generally the condenser water system is in the form of a ring main connected in parallel to a number of stand-alone CyberAir units mounted in the critical space.
2.2 Intended use
This A/C unit is used to control room temperature and air humidity. The A/C unit is designed for indoor installation. Any use beyond this is not deemed to be use as intended. STULZ is not liable for any damage resulting from such misuse. The operator alone bears the risk.

2.3 Design of the A/C unit
The A/C unit is exclusively operated by the controller in the front panel and the main switch in the electric box. All the electrics to control and monitor the A/C unit is located in the electric box which is placed in the upper half of the unit front side. All the wiring of the A/C unit comes together in the electrical section and is connected here.

The heat exchangers extend to the entire unit width. The refrigerant circuit with all his components is located in the bottom part of the unit. The compressors are situated in a separate housing. Radial fans generate the airflow.

Each unit exists as an Upflow- and Downflow version, the essential difference of which, in contribution to the airflow direction, consists in the relative position of the heat exchanger to the fans, as can be seen opposite.

The A/C unit control is effected by the on board I/O controller. The operational conception is designed such as to allow to control up to 31 units from one unit. These units can be installed separately with a maximum control line length of 1000 m.

The supply connections (electrical power supply and pipe connections) are conducted to the bottom at Downflow units and to the side at Upflow units as standard.
2.4 Basic components/function of refrigerant circuit

The refrigeration circuit consists of a **compressor**, a **condenser**, an **expansion valve** and an **evaporator**. In units of the G version, these components are connected by pipelines to a sealed refrigerant circuit. In units of the A version, an external air-cooled condenser must be connected to the open refrigerant circuit of the unit.

The compressor is used to compress the refrigerant and maintain the refrigerant flow. The gaseous refrigerant is compressed in the compressor to approx. 20 bar at approx. 70°C and enters then the condenser. The condenser gives up the heat absorbed and liquefies the refrigerant which is under high pressure. The refrigerant temperature drops down to approx. 40°C in the condenser. The liquid refrigerant enters the expansion valve and is from there conducted back to the evaporator at low pressure (about 6 bar) and low temperature (about 10°C). The heat of the air is absorbed by the gaseous low temperature refrigerant in the evaporator at an evaporation temperature of about 10°C. All components of the refrigerant circuit are designed for a maximum operating pressure of 27.5 bar.

**Dehumidifying circuit**

Approximately one third of the evaporator is isolated via a solenoid valve to achieve a dehumidification by passing below the dew point. As a result the evaporating pressure and temperature of the refrigerant reduces and the air flowing through the evaporator coil falls below the dew point. The moisture contained in the air condenses on the evaporator and is carried away.

**Monitoring devices**

The A/C units have various safety devices to avoid malfunctions. In the liquid line there is a **filter drier** to separate humidity and a **sight glass** to check the sufficient charge of refrigerant. A-units are also equipped with a **solenoid valve in the liquid line** which shuts off the refrigerant flow when the A/C unit is shut down.

**Safety devices**

The refrigerant circuit is protected against insufficient operating pressure by a **safety pressure limiter (low-pressure switch)**. If the operating pressure is fallen below, a warning signal appears on the display and the unit is put out of operation. A **safety pressure cut-out (high-pressure switch)** is triggered at 24.5 bar and switches off the compressor. A warning signal on the display of the controller appears. A **liquid receiver** and a **safety valve**, which releases refrigerant at 27.5 bar, are fitted on A-units as further protection.

**Adjustment of the pressure switches:**

**LP switch:**
- releases at: 1.0 bar
- automatic reset at: 3.0 bar

**HP switch:**
- releases at: 24.5 bar
- manual reset possible at: 18.0 bar

**Safety valve:** 27.5 bar
2.5 Cooling water circuit (G)

In G-units, the cooling water circuit contains a plate condenser as interface to the refrigerant circuit and a valve for filling and draining.
3. Refrigerant circuit

Legend

- **PS-**: Low pressure switch
- **PS+**: High pressure switch
- **PC**: Pressure sensor
- **TIC**: Temperature sensor with indication
- **TC**: Temperature sensor

- **Expansion valve**
- **Filter drier**
- **Sight glass**
- **2-way solenoid valve**
- **Angle valve**
- **Stop valve**
- **Pressure relief valve**
- **Schrader valve**
- **3-way cooling water control valve**
- **Non-return valve**
- **Filling and drain valve**
3.1 Cooling system A

1 - circuit

2 - circuit
3.2 Cooling system G

1 - circuit

2 - circuit
4. Technical data

4.1 Application limits

The STULZ Compact DX units are provided for operation within the following ranges:

- Room conditions:
  Between 18°C, 45% R.H. and 27°C, 55% R.H.

- Outdoor ambient conditions:
  lower limit: -10°C
  upper limit: dependent on the selected condenser

- Voltage:
  - Standard
    200V / 3ph / 50Hz; PE +/- 10%
    220V / 3ph / 50Hz; PE +/- 10%
    230V / 3ph / 50Hz; PE +/- 10%
    380V / 3ph / 50Hz; N; PE +/- 10%
    400V / 3ph / 50Hz; N; PE +/- 10%
    415V / 3ph / 50Hz; N; PE +/- 10%

- Frequency: 50 Hz +/- 1%

- Cooling water pipes:
  max. water head pressure: 10 bar

- Hot water conditions for optional heating coil:
  max. inlet water temperature: 110°C
  max. water head pressure: 8.5 bar

- Max. length of piping between A/C unit and air cooled condenser: 30m equivalent.

- Max. level difference between condenser and A/C unit: 3m (when condenser is below the A/C unit).

- Storage conditions:
  Temperature [°C]: -20 - +42
  Humidity [% rel. h.]: 5 - 95
  Atmosphere pressure [kPa]: 70 - 110

The warranty is invalidated for any possible damage or malfunction that may occur during or in consequence of operation outside the application ranges.

Design conditions for technical data:

Return air conditions for evaporator capacity (DX):
24°C, 50% rel. hum.

Condensation temperature:
45°C

Max. condensation temperature:
60°C

Cooling fluid (DX):
30% Glycol

Fluid inlet temperature (G):
35°C

Fluid outlet temperature (G):
40°C

All data is valid for:
for Downflow units with an external static pressure: 400V/3ph/50Hz
for Upflow units with an external static pressure: 20 Pa

50 Pa

The sound pressure levels are valid at a height of 1 m and distance of 2 m in front of the unit under free field conditions and with nominal data. The values take into account the effects of all installation and design parts contained in the standard unit. The values for upflow units assume an installed discharge duct.
### 4.2 Technical Data - CSD/U ... A/G - 1-circuit

<table>
<thead>
<tr>
<th>Type</th>
<th>171</th>
<th>201</th>
<th>271</th>
<th>301</th>
<th>351</th>
<th>431</th>
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<td></td>
<td>55,2</td>
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<tr>
<td>Motor power consumption kW</td>
<td></td>
<td>1,4</td>
<td>2,3</td>
<td>2,6</td>
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<td>Motor operating current A</td>
<td></td>
<td>4,7</td>
<td>4,7</td>
<td>4,68</td>
<td>4,68</td>
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<td>1750</td>
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<td>Height mm</td>
<td></td>
<td>1980</td>
<td>1980</td>
<td>1980</td>
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<td>Depth mm</td>
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<td>890</td>
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</tr>
</tbody>
</table>

1 for nominal current (FLA) and locked rotor current (LRA), heating and humidifier equipment see page 20

P_ext.stat = 20Pa (Downflow) / 50Pa (Upflow)

### Weights [kg]

<table>
<thead>
<tr>
<th>1-circuit</th>
<th>171</th>
<th>201</th>
<th>271</th>
<th>301</th>
<th>351</th>
<th>431</th>
<th>521</th>
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<tbody>
<tr>
<td>A</td>
<td>D</td>
<td>360</td>
<td>365</td>
<td>425</td>
<td>455</td>
<td>480</td>
<td>520</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>370</td>
<td>375</td>
<td>435</td>
<td>465</td>
<td>490</td>
<td>540</td>
</tr>
<tr>
<td>G</td>
<td>D</td>
<td>380</td>
<td>385</td>
<td>485</td>
<td>510</td>
<td>537</td>
<td>580</td>
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<tr>
<td></td>
<td>U</td>
<td>390</td>
<td>395</td>
<td>504</td>
<td>525</td>
<td>550</td>
<td>600</td>
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E/1007/28/18
### 4.3 Technical Data - CSD/U ... A/G - 2-circuits

<table>
<thead>
<tr>
<th>Type</th>
<th>352</th>
<th>442</th>
<th>542</th>
<th>602</th>
<th>652</th>
<th>702</th>
<th>852</th>
<th>1052</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX-cooling capacity total 24°C/50% r.H. sensible kW</td>
<td>36.1</td>
<td>46.3</td>
<td>54.5</td>
<td>63.3</td>
<td>69.6</td>
<td>72.0</td>
<td>87.3</td>
<td>104.3</td>
</tr>
<tr>
<td>Ratio sens./total</td>
<td>1.00</td>
<td>0.93</td>
<td>0.94</td>
<td>0.94</td>
<td>0.89</td>
<td>0.90</td>
<td>0.88</td>
<td>0.85</td>
</tr>
<tr>
<td>Airflow m³/h</td>
<td>10000</td>
<td>11900</td>
<td>14500</td>
<td>17300</td>
<td>18000</td>
<td>18500</td>
<td>21000</td>
<td>24000</td>
</tr>
<tr>
<td>Compressor type</td>
<td>2 x C3</td>
<td>2 x C5</td>
<td>2 x C13</td>
<td>2 x C7</td>
<td>2 x C8</td>
<td>2 x C9</td>
<td>2 x C10</td>
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</tr>
<tr>
<td>Comp. power consumption kW</td>
<td>7.2</td>
<td>9.6</td>
<td>11.2</td>
<td>12.8</td>
<td>14.4</td>
<td>14.4</td>
<td>18.4</td>
<td>22.0</td>
</tr>
<tr>
<td>Comp. operating current A</td>
<td>14.72</td>
<td>18.9</td>
<td>21.7</td>
<td>27.26</td>
<td>28.22</td>
<td>28.22</td>
<td>32.92</td>
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<td>EER max (CSD...A/G)</td>
<td>3.97</td>
<td>3.80</td>
<td>3.10</td>
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<td>EER min (CSU...A/G)</td>
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<td>3.51</td>
<td>3.10</td>
<td>3.30</td>
<td>3.03</td>
<td>3.46</td>
<td>3.52</td>
<td>3.42</td>
</tr>
<tr>
<td>R407C-charge (A/G) kg</td>
<td>1.0/2.1</td>
<td>1.0/2.4</td>
<td>1.0/3.1</td>
<td>1.0/3.8</td>
<td>1.0/4.1</td>
<td>1.0/4.4</td>
<td>1.0/4.6</td>
<td>1.0/5.2</td>
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<tr>
<td>Water flow G m³/h</td>
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<td>10.7</td>
<td>12.4</td>
<td>14.2</td>
<td>15.9</td>
<td>16.0</td>
<td>19.9</td>
<td>23.6</td>
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<tr>
<td>dp condenser G kPa</td>
<td>23</td>
<td>18</td>
<td>24</td>
<td>19</td>
<td>23</td>
<td>24</td>
<td>22</td>
<td>31</td>
</tr>
<tr>
<td>dp pipework G - D/U kPa</td>
<td>22/9</td>
<td>19/8</td>
<td>21/8</td>
<td>17/6</td>
<td>13/7</td>
<td>17/6</td>
<td>23/8</td>
<td>32/11</td>
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<tr>
<td>3-way-valve size G (option)</td>
<td>1 1/4”</td>
<td>1 1/2”</td>
<td>2”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dp valve G (option) kPa</td>
<td>29</td>
<td>44</td>
<td>32</td>
<td>41</td>
<td>28</td>
<td>28</td>
<td>44</td>
<td>61</td>
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<tr>
<td>Fan type</td>
<td>AT18-18S</td>
<td>AT18-13G2L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. ext. stat. pressure Pa</td>
<td>670</td>
<td>580</td>
<td>410</td>
<td>290</td>
<td>120</td>
<td>680</td>
<td>450</td>
<td>200</td>
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<tr>
<td>Sound pressure level dBA</td>
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<td>46.5</td>
<td>50.5</td>
<td>56.1</td>
<td>56.9</td>
<td>58.9</td>
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<td>Motor type M</td>
<td>1 M1</td>
<td>2 M2</td>
<td>3 M5</td>
<td>4 M6</td>
<td>5 M4</td>
<td>6 M5</td>
<td>7 M6</td>
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</tr>
<tr>
<td>Mot power consumption kW</td>
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<td>8.5</td>
<td>4.7</td>
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<tr>
<td>Max. ext. stat. pressure Pa</td>
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<td>140</td>
<td>120</td>
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<td>3 M3</td>
<td>5 M5</td>
<td>6 M6</td>
<td>4 M5</td>
<td>5 M6</td>
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<tr>
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<td>11.05</td>
<td>11.05</td>
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<td>11.05</td>
<td>11.05</td>
<td>14.5</td>
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<td>6</td>
<td></td>
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<td></td>
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</table>

#### Dimensions

<table>
<thead>
<tr>
<th></th>
<th>Width mm</th>
<th>Height mm</th>
<th>Depth mm</th>
</tr>
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<tbody>
<tr>
<td>Width mm</td>
<td>1750</td>
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<td>1980</td>
</tr>
<tr>
<td>Depth mm</td>
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<td>890</td>
<td>890</td>
</tr>
</tbody>
</table>

1 for nominal current (FLA) and locked rotor current (LRA), heating and humidifier equipment see page 20
2 charge per refrigerant circuit

\( p_{ext.stat.} : 20\text{Pa} \text{ (Downflow) / 50\text{Pa (Upflow)}} \)

### Weights [kg]

<table>
<thead>
<tr>
<th>2-circuits</th>
<th>352</th>
<th>442</th>
<th>542</th>
<th>602</th>
<th>652</th>
<th>702</th>
<th>852</th>
<th>1052</th>
</tr>
</thead>
<tbody>
<tr>
<td>A D</td>
<td>540</td>
<td>570</td>
<td>600</td>
<td>630</td>
<td>755</td>
<td>780</td>
<td>840</td>
<td>880</td>
</tr>
<tr>
<td>A U</td>
<td>570</td>
<td>600</td>
<td>630</td>
<td>780</td>
<td>800</td>
<td>910</td>
<td>950</td>
<td>1025</td>
</tr>
<tr>
<td>G D</td>
<td>570</td>
<td>600</td>
<td>630</td>
<td>790</td>
<td>804</td>
<td>890</td>
<td>928</td>
<td>1000</td>
</tr>
<tr>
<td>G U</td>
<td>600</td>
<td>625</td>
<td>660</td>
<td>820</td>
<td>840</td>
<td>960</td>
<td>1002</td>
<td>1080</td>
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</table>
4.4 Electrical Data - 400V / 3ph / 50Hz

<table>
<thead>
<tr>
<th>Fan power</th>
<th>( P_N ) [kW]</th>
<th>LRA [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>1,5</td>
<td>17,5</td>
</tr>
<tr>
<td>M2</td>
<td>2,2</td>
<td>27,5</td>
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<tr>
<td>M3</td>
<td>3,0</td>
<td>37,2</td>
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<td>M4</td>
<td>4,0</td>
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<td>M5</td>
<td>5,5</td>
<td>62,4</td>
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<td>M6</td>
<td>7,5</td>
<td>86,4</td>
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</table>

<table>
<thead>
<tr>
<th>Compressor</th>
<th>FLA [A]</th>
<th>LRA [A]</th>
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</thead>
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<tr>
<td>C3</td>
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<tr>
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<td>7,6</td>
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<td>C5</td>
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<td>101</td>
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<td>C6</td>
<td>11,5</td>
<td>99</td>
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<td>C7</td>
<td>13,6</td>
<td>123</td>
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<tr>
<td>C8</td>
<td>14,1</td>
<td>127</td>
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<td>C9</td>
<td>16,5</td>
<td>167</td>
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<td>C10</td>
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<tr>
<td>C13</td>
<td>10,9</td>
<td>95</td>
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</table>

- \( P_N \): Nominal power
- FLA: Full load amp - nominal current
- LRA: Locked rotor amp

**Electrical Heating**

<table>
<thead>
<tr>
<th>Stages</th>
<th>Nom. power [kW]</th>
<th>Nom. current [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L1 - L2 - L3</td>
<td>total</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>0 - 10,0 - 10,0</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>13,1 - 13,1 - 13,1</td>
</tr>
<tr>
<td>3</td>
<td>4 + 4</td>
<td>10,0 - 17,3 - 10,0</td>
</tr>
<tr>
<td>3</td>
<td>9 + 4</td>
<td>13,1 - 23,1 - 23,1</td>
</tr>
<tr>
<td>3</td>
<td>9 + 9</td>
<td>26,2 - 26,2 - 26,2</td>
</tr>
<tr>
<td>3</td>
<td>4 + 4 + 4</td>
<td>17,3 - 17,3 - 17,3</td>
</tr>
<tr>
<td>3</td>
<td>9 + 4 + 4</td>
<td>23,1 - 30,4 - 23,1</td>
</tr>
<tr>
<td>3</td>
<td>9 + 9 + 4</td>
<td>26,2 - 36,2 - 36,2</td>
</tr>
<tr>
<td>3</td>
<td>9 + 9 + 9</td>
<td>39,2 - 39,2 - 39,2</td>
</tr>
</tbody>
</table>

**Steam humidifier**

<table>
<thead>
<tr>
<th>Hum. capacity [kg/h]</th>
<th>Nom. current [A]</th>
<th>Nom. power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5,4</td>
<td>3,75</td>
</tr>
<tr>
<td>8</td>
<td>8,7</td>
<td>6,0</td>
</tr>
<tr>
<td>10</td>
<td>10,8</td>
<td>7,5</td>
</tr>
<tr>
<td>15</td>
<td>16,2</td>
<td>11,25</td>
</tr>
</tbody>
</table>

**Humidifier- & Heating Assignment to the construction sizes**

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidifying capacity [kg/h]</td>
<td>5</td>
<td>5/8</td>
<td>5/8/10/15</td>
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<td></td>
</tr>
<tr>
<td>Heating capacity Stage 1 [kW]</td>
<td>4/9</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Heating capacity Stage 2 [kW]</td>
<td>4/9</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating capacity Stage 3 [kW]</td>
<td>4/9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total max. heating capacity [kW]</td>
<td>12</td>
<td>18</td>
<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For all units max. 3 heating stages are possible.
4.5 Dimensional drawings
4.5.1 Cabinet size 1

Downflow

Upflow
4.5.2 Cabinet size 2

Downflow

Dimensions:
- Width: 1400 mm
- Height: 1980 mm
- Depth: 890 mm
Cabinet size 2

Upflow

Dimensions:
- 1400 x 890
- 1980 x 890
- 1400 x 890
4.5.3 Cabinet size 3

Downflow
Cabinet size 3

Upflow
4.5.4 Cabinet size 4

Downflow

Dimensions:
- Width: 1980 mm
- Height: 2150 mm
- Depth: 890 mm

[Diagram of cabinet size 4]
Cabinet size 4

Upflow

Dimensions:
- Length: 1980 mm
- Width: 890 mm
4.5.5 Cabinet size 6

Downflow

Dimensions:
- 1960 x 890
- 2725 x 2725

E/1007/28/28
Cabinet size 6

Upflow

- 1980
- 890
- 2725
- 068
- 2725
- 2725
5. Transport / Storage

5.1 Delivery of units
Stulz A/C units are mounted on pallets and packed several times in plastic film. They must always be transported upright on the pallets.

Units of the version A are delivered with 1 kg refrigerant charge.
Units of the version G contain the complete refrigerant charge.

Construction of protective covering
(from inside to outside)

1. Neopolene cushioning
2. Shrink film
3. Additional board in container shipments

The following information can be found on the packing.
1) Stulz logo
2) Stulz order number
3) Type of unit
4) Packing piece - contents
5) Warning symbols

also upon request
6) Gross weight
7) Net weight
8) Dimensions
9) Customer order number
10) Additional customer requirements

When delivery is accepted, the unit is to be checked against the delivery note for completeness and checked for external damage which is to be recorded on the consignment note in the presence of the freight forwarder.

• The delivery note can be found on the A/C unit when delivered.
• The shipment is made ex works, in case of shipment damages, please assert your claim towards the carrier.
• Hidden damage is to be reported in writing within 6 days of delivery.

5.2 Transport
The Stulz A/C units can be moved by lifting devices with ropes, for this the ropes have to be fixed at the pallet, and the upper unit edges have to be protected by wooden laths or metal brackets in such a way that they could not be caved in.
You can move the unit still packaged on the pallet with a fork lift, if you take care that the centre of gravity is within the fork surface. Take care that the unit is in an upright position at the transport.

5.3 Storage
If you put the unit into intermediate storage before the installation, the following measures have to be carried out to protect the unit from damage and corrosion:

• Make sure that the water connections are provided with protective hoods. If the intermediate storage exceeds 2 months, we recommend filling the pipes with nitrogen.
• the temperature at the storage point should not be higher than 42°C, and the site should not be exposed to direct sunlight.
• the unit should be stored packaged to avoid the risk of corrosion especially of the condenser fins.
6. Installation

6.1 Positioning
Check that the installation site is appropriated for the unit weight, which you can read in the technical data. The A/C unit is designed for the inside installation on a level base. The solid base frame contributes significantly to an even weight distribution. When selecting the installation site take into account the necessary clearances for the maintenance and the air flow.

⚠️ The unit may not be operated in an explosive atmosphere!

![Maintenance clearance](image)

![Air intake area for Downflow units and air outlet area for Upflow units without duct connection](image)

6.2 Air side connection (optional)
For the air side connection exist different options, which are designed as a simple ducting system (SDS), which means that they can be easily moved and put together on the installation site, a time-saving aspect. For each construction size there are specific front and rear parts according to the unit width.

**Discharge plenum**
- width: according to the unit width
- depth: according to the unit depth
- height: 500 mm

**Sound insulation plenum**
- width: according to the unit width
- depth: according to the unit depth
- height: 500/800 mm
Duct
width: according to the unit width
depth: according to the unit depth
height: 500/800 mm

Duct set on system with bag filter
width: according to the unit width
depth: according to the unit depth
height: 400 mm

Unit base
width: unit width minus 40 mm
depth: 865 mm
height: 450 mm

Unit base with grilles
width: unit width minus 40 mm
depth: 865 mm
height: 450 mm

Unit base with damper
width: unit width minus 40 mm
depth: 865 mm
height: 450 mm

Unit base with flexible connection
width: unit width minus 40 mm
depth: 865 mm
height: 450 mm
6.3 Connection of the piping
6.3.1 Pipe entrance area

Downflow units
At Downflow units the supply pipes and cables are introduced from the bottom through openings in the base plate.

Cabinet size 1

Bottom view

Refrigerant lines (A-units)
Cooling water (G-units)
Power supply
Refrigerant lines (A-units)
Cooling water (G-units)
Cond. drain
Humidifier
Cabinet size 2

Bottom view

- Power supply
- Refrigerant lines (A-units)
- Cooling water (G-units)

Cond. drain
Humidifier

Cabinet size 3

Cond. drain

Humidifier (A-units, 1 and 2 circuits)
G-units, 1 circuit)

Refr. lines (A-units, 2 circuits)

Power supply

Refr. lines (A-units, 1 and 2 circuits)
Cooling water (G-units, 1 circuit)

Cooling water (G-units, 2 circuits)

Humidifier (G-units, 2 circuits)
Bottom view

Cabinet size 4

- Humidifier (A-units)
- Condensate drain
- Cooling water (G-units)
- Refrigerant line, circuit 2 (A-units)
- Power supply
- Refrigerant line, circuit 1 (A-units)
- Condensate drain
- Humidifier (G-units)
Upflow units

At Upflow units the supply pipes and cables are introduced from the left or right side through openings in the side wall.

connection from the left

<table>
<thead>
<tr>
<th>A-units</th>
<th>L3/4</th>
<th>L5/6</th>
<th>L7/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>171, 201</td>
<td>0</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>271,301,351</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>431,521</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>352,442,542</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>602 - 1052</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G-units</th>
<th>L3/4</th>
<th>L7/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>171, 201</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>271 - 521</td>
<td>x</td>
<td>0</td>
</tr>
<tr>
<td>352,442,542</td>
<td>x</td>
<td>0</td>
</tr>
<tr>
<td>602 - 1052</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

connection from the right

<table>
<thead>
<tr>
<th>A-units</th>
<th>R1/2</th>
<th>R3/4</th>
<th>R5/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>171, 201</td>
<td>0</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>271,301,351</td>
<td>0</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>431,521</td>
<td>0</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>352,442,542</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>602 - 1052</td>
<td>x</td>
<td>0</td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G-units</th>
<th>R5/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>171, 201</td>
<td>0</td>
</tr>
<tr>
<td>271 - 521</td>
<td>0</td>
</tr>
<tr>
<td>352,442,542</td>
<td>0</td>
</tr>
<tr>
<td>602 - 1052</td>
<td>x</td>
</tr>
</tbody>
</table>

all dimensions in mm

The tables above indicate, which of the openings can be used for refrigerant lines (A-units) and cooling water lines (G-units) depending on the unit size.

x = can be used
0 = not possible
6.3.2 Position of the refrigerant connections (A-units)

Diameter of refrigerant lines (1 circuit)

<table>
<thead>
<tr>
<th>Unit</th>
<th>171</th>
<th>201</th>
<th>271</th>
<th>301</th>
<th>351</th>
<th>431</th>
<th>521</th>
</tr>
</thead>
<tbody>
<tr>
<td>pressure line</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>liquid line</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Diameter of refrigerant lines (2 circuits)

<table>
<thead>
<tr>
<th>Unit</th>
<th>352</th>
<th>442</th>
<th>542</th>
<th>602</th>
<th>652</th>
<th>702</th>
<th>852</th>
<th>1052</th>
</tr>
</thead>
<tbody>
<tr>
<td>pressure line</td>
<td>16</td>
<td>16</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>liquid line</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

The refrigerant connections are located near the compressor and are labelled by the inscriptions "pressure pipe" and "liquid pipe" respectively "pressure pipe 1" and "pressure pipe 2" etc. for 2-circuit units. The lines to be connected have to be soldered. For the connection of the external pipework please note the pipe entrance area on the pages 33 - 37.

In A-units of the Compact DX series, in contrast to the precedent Compact-Line series, no non-return valve is installed upstream the liquid receiver as standard.

Only in case of very long pipework from the condenser to the unit and with low outside temperatures it may be useful to install a non-return valve near the condenser to prevent a reverse flow of refrigerant to the condenser when the unit is stopped and to avoid a possible low pressure fault at the unit start. Such a non-return valve can be obtained as an option from Stulz. (The C7000 controller provides the feature to adjust a winter start delay of 0-255 seconds. For this time, the monitoring of the low pressure is inhibited.) A long refrigerant line from the non-return valve to the receiver provides an additional buffer to cushion a possible excessive pressure at unfavourable operating conditions.
6.3.3 Refrigerant Piping

All work on refrigeration systems may only be carried out by competent staff or by STULZ customer service

6.3.3.1 Selection of pressure and liquid line

- Establish the shortest route for pipework from the unit to the condenser. Exceptions only when unnecessary bends are to be avoided.
- Determine the required pipe fittings/specials between the unit and condenser.
- With the aid of table No. 1, convert the pressure loss of the individual fittings into equivalent pipe lengths, look up equivalent pipe lengths for pipe specials and fittings, add these to the real pipe lengths.
- Select the pipe dimensions from diagram No. 1 on the following page corresponding to the calculated overall pipe length and refrigeration output.

Precautions for pressure line, if the condenser is higher than the unit.

- To ensure oil return in ascending hot gas lines, particularly at part load, the minimum refrigeration capacity must not fall below the value stated on table 2 of the following page, for the corresponding pipe size.
- An oil separator must be installed in systems with a pipe length above 25 m.
- Oil traps (even when an oil separator is installed) are to be installed every 5-6 m (illustr. 3, p. 42).
- The horizontal lines must always be routed with a slope towards the condenser.

Recommendation for liquid lines:

With liquid refrigerant, bubbles can form upstream of the expansion valve. This is always the case when the ambient temperature is higher than the temperature of the liquid line (approx. +30°C) upstream of the expansion valve. In this case insulation with Armaflex or equivalent material with a wall thickness of 9 mm is recommended for lines outside the unit. A thicker insulation is not required as the insulating effect increases only insignificantly as the wall thickness increases.

Precautions for pressure lines:

Pressure lines can reach a temperature of up to +80°C and should be insulated inside the building at places, where a possibility of contact exists (risk of burn!).

Table 1: Pressure drop of pipe fittings/specials in metres for equivalent pipe length

<table>
<thead>
<tr>
<th>Copper pipe outside - Ø mm</th>
<th>Bend 45°</th>
<th>Bend 90°</th>
<th>Bend 180°</th>
<th>Bend 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0,16</td>
<td>0,20</td>
<td>0,53</td>
<td>0,32</td>
</tr>
<tr>
<td>12</td>
<td>0,21</td>
<td>0,27</td>
<td>0,70</td>
<td>0,42</td>
</tr>
<tr>
<td>15</td>
<td>0,24</td>
<td>0,30</td>
<td>0,76</td>
<td>0,48</td>
</tr>
<tr>
<td>18</td>
<td>0,26</td>
<td>0,36</td>
<td>0,87</td>
<td>0,54</td>
</tr>
<tr>
<td>22</td>
<td>0,27</td>
<td>0,42</td>
<td>0,98</td>
<td>0,61</td>
</tr>
<tr>
<td>28</td>
<td>0,39</td>
<td>0,51</td>
<td>1,20</td>
<td>0,79</td>
</tr>
<tr>
<td>35</td>
<td>0,51</td>
<td>0,70</td>
<td>1,70</td>
<td>1,00</td>
</tr>
<tr>
<td>42</td>
<td>0,64</td>
<td>0,80</td>
<td>1,90</td>
<td>1,20</td>
</tr>
</tbody>
</table>
Selection of the pipe diameters
Diagrams for designing the refrigerant lines for R407C/R22

Minimum refrigeration outputs which are required for oil transportation in rising pipes of pressure lines for R407C/R22 at tc (dew point) 48°C.

<table>
<thead>
<tr>
<th>Pipe diameter</th>
<th>mm</th>
<th>15</th>
<th>18</th>
<th>22</th>
<th>28</th>
<th>35</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrig. capacity</td>
<td>kW</td>
<td>4.41</td>
<td>5.17</td>
<td>7.14</td>
<td>10.0</td>
<td>16.58</td>
<td>25.9</td>
</tr>
</tbody>
</table>
6.3.3.2 Routing refrigerant-conducting pipes

Never route pipelines through rooms such as conference rooms, rest rooms, offices etc.

Pipe mountings are to be provided at least every 2 m. The pipe mountings are to be insulated against vibrations. The first pipe mounting behind the unit and upstream of the condenser should be flexible. So that the pressure lines can expand, the pipe mountings are to be attached at least 1 m from the bend, in accordance with sketch No. 1, following page.

- All copper pipes which pass through masonry must be insulated in this area so that the pipes are protected from damage and a certain flexibility is retained.

- For routing, only copper pipes are to be used which correspond to the national regulations. Sealing caps or ends added as flux must be meticulously clean and dry and meet the requirements of refrigeration engineering.

- Before commencing with routing the pipelines, one should ensure that the pipes are dry and clean inside, by checking whether the sealing caps are seated on the pipe ends and by blowing through the pipes with nitrogen. If the sealing caps are no longer seated on the pipe ends, the pipes must be cleaned with a clean non fraying cloth and a spiral and then blown through with nitrogen to remove the remaining dirt. Furthermore it must be ensured that the remaining pipe is always sealed with a plug after cutting off pipe ends.

- Pipes for refrigerant must always be cut to length with a pipe cutter and then brought to the correct inside diameter by slightly expanding or calibrating.

Sawing refrigerant pipes is not permitted as the swarf cannot be completely removed and blockages can occur in the control components or the compressor may be irreparably damaged. The same can also occur as a result of contaminated pipes.

- If copper pipes are flared, the taper of the tube flaring tool must be coated lightly with refrigerator oil to prevent a burr occurring on the copper pipe during the flaring process which can enter the pipe. According to EN 378, pipes with a diameter < 9 mm and > 19 mm may not be flared.

- Refrigerant-conducting pipes may only be brazed under nitrogen so that no oxidisation occurs on the inside of the pipes which also contaminates pipelines.

Before the final connection is brazed, a screwed connection must be released at the appropriate point so that no pressure occurs in the pipe system.

After brazing, do not forget to retighten the screwed connection which has been released.

Once the pipework installation is finished, it is mandatory that the system is checked for leaks and for pressure resistance. This must be carried out as follows:

- The system is filled with dry nitrogen up to the maximum nominal pressure.
- The system is shut off, the valve in the system is closed and the nitrogen bottle is removed.
- Each connection (including screwed connections) is checked for leaks by brushing on a liquid. In parallel with this check a pressure gauge is connected on which it can again be checked whether the system is leaking, the pressure on the pressure gauge being checked for a reasonable period according to the size of the system.
Instructions for the routing of refrigerant-conducting pipes

Mounting the refrigerant pipes in corners
Sketch 1

Routing pressure lines when the Condenser is higher than the compressor.

Use oil separator for rising pipe longer than 25m.
Sketch 3

For height differences of over 5 m the system must be designed so as to guarantee additional subcooling (consult STULZ).
Sketch 4
6.3.3.3 Evacuating refrigeration systems

Explanation of the evacuation process with reference to the numbers overleaf.
<table>
<thead>
<tr>
<th>Process</th>
<th>Values</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparation</td>
<td></td>
<td><strong>Open the valves (1) to (5). Close the valve (9).</strong></td>
</tr>
<tr>
<td>2. Evacuation</td>
<td>70 mbar</td>
<td><strong>Operate the vacuum pump until the value of 70 mbar is displayed on the pressure gauge. Stop the vacuum pump after evacuation.</strong></td>
</tr>
<tr>
<td>3. Breaking vacuum</td>
<td>0.98 bar</td>
<td><strong>Close the valves (3), (4) and (5). Open the valve (9) and fill refrigerant whilst the high pressure gauge (6) and the low pressure gauge (7) are observed. When the value of 0.98 bar is reached, close valve (9).</strong></td>
</tr>
<tr>
<td>4. Waiting time</td>
<td>5 minutes</td>
<td><strong>———</strong></td>
</tr>
<tr>
<td>5. Disposal</td>
<td></td>
<td><strong>Disposal of refrigerant in accordance with the valid country-specific regulations. (e.g. using disposal station for FC)</strong></td>
</tr>
<tr>
<td>6. Repeat 2. - 5.</td>
<td>1 x</td>
<td>as the above items</td>
</tr>
<tr>
<td>7. Last evacuation</td>
<td>1-2 mbar</td>
<td>as item 2</td>
</tr>
<tr>
<td>8. Completion</td>
<td></td>
<td><strong>Close the suction side valves (3), (4) and (5). Stop the vacuum pump.</strong></td>
</tr>
<tr>
<td>9. Filling refrigerant</td>
<td>As required by system</td>
<td><strong>Open the valve (9). Pre-fill the liquid receiver with refrigerant. The correct amount to be filled must be determined during the operation of the compressor. Close all valves after completing the filling process.</strong></td>
</tr>
</tbody>
</table>

For reference see the illustration on the previous page.
6.3.3.4 Filling systems with R22 and R407C refrigerants

- Open the stop valves and fill the refrigerant circuit with refrigerant. For this, the solenoid valve in the liquid line must be energized (24 V AC), for the refrigerant can evenly disperse in the circuit.

- Systems without refrigerant receiver or sight glass must always be filled according to weight.

- Systems with refrigerant receiver should be filled according to weight but can also be filled by checking the sight glass.

**If you use the refrigerant R407C, please note that R407C is a 3-compound mixture. Take care that you add refrigerant in a liquid state, as the ratio of the refrigerant components changes if one of the three compounds passes over into the gaseous phase.**

- Before the system is filled with refrigerant, it must be clean and dry inside. (Refer to evacuation instructions). Then proceed as follows:

  The standing refrigerant bottle is connected to the suction side via a pressure gauge station. The weight is noted shortly before filling. The specified amount of refrigerant is now added when the system is operating. During filling the pressure in the refrigerant bottle will adjust to that of the system. Filling is then no longer necessary.

  This can be seen by the icing up of the bottle or by checking the pressure gauge. The bottle valve must then be closed until a pressure increase has taken place which is above the suction pressure of the system. This process can be accelerated if the bottle is wrapped in hot moist towels or it is placed in a water bath at a maximum temperature of 50°C.

**Never heat up the refrigerant bottle with a naked flame as there is a risk of explosion.**

For R134a: Refer to the special requirements of the refrigerant manufacturer.
Hazards with incorrectly filled systems

**Overfilling**
Overfilling the system inevitably results in a high condensing pressure. The high pressure switch can trigger as a result.

**Underfilling**
A system which is insufficiently filled results in the following:
Output reduction due to evaporation temperatures which are too low and triggering of the low pressure switch. Excessive overheating temperature which can result in compressor damage.

- **Recommended overheating:** 7 - 10 K
- **Recommended subcooling:** > 2 K
6.3.4 Position of the water connections (for version G)

In 1-circuit units and 2-circuit units there is only one water circuit and hence one connection for the water inlet and outlet respectively.

Example:
Downflow unit

In 1-circuit units and 2-circuit units there is only one water circuit and hence one connection for the water inlet and outlet respectively.

For the connection of the external pipework please note the pipe entrance area on the pages 33 - 37. For upflow-units of size 171-521 and 352-542 the connection is made from the left unit side. For upflow-units of size 602-1052 the connection is made from the right unit side.

Diameter of the cooling water lines (1 circuit)

<table>
<thead>
<tr>
<th>Unit</th>
<th>171</th>
<th>201</th>
<th>271</th>
<th>301</th>
<th>351</th>
<th>431</th>
<th>521</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet/outlet</td>
<td>28</td>
<td>35</td>
<td>35</td>
<td>42</td>
<td>42</td>
<td>54</td>
<td>54</td>
</tr>
</tbody>
</table>

Diameter of the cooling water lines (2 circuits)

<table>
<thead>
<tr>
<th>Unit</th>
<th>352</th>
<th>442</th>
<th>542</th>
<th>602</th>
<th>652</th>
<th>702</th>
<th>852</th>
<th>1052</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet/outlet</td>
<td>42</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>70*</td>
<td>70*</td>
</tr>
</tbody>
</table>

*Attention: Concerning the unit sizes 852 and 1052, the pipework from the 70mm screw connection must be carried out as pipes of 64mm diameter.
Cooling water circuit (only for version G)

Connect the unit to a dry cooler or cooling tower to seal the cooling water circuit which must be provided with a pump and an expansion tank with safety valve to convey the cooling water. If the water quality is insufficient, we recommend the additional installation of a fine mesh strainer.

For an efficient protection against corrosion, the anti-freezing agent is mostly sufficient, which should be used if the water temperature passes under 5°C or if the outside temperature is less than 0°C. We recommend to add the following quantities of ethylene glycol (indicated as percentage of weight of the water quantity):

<table>
<thead>
<tr>
<th>Water or Outside Air Temperature</th>
<th>Ethylene Glycol</th>
</tr>
</thead>
<tbody>
<tr>
<td>From -5 to -10°C</td>
<td>20%</td>
</tr>
<tr>
<td>From -10 to -30°C</td>
<td>30%</td>
</tr>
</tbody>
</table>

- For connecting the unit to the external system remove the protective caps from of the water pipe screw connections.

**Water remaining from the test run may escape when the protective caps are removed.**

- The water connections are executed in the shape of a screw connection with a soldering connection. Solder the part with the external thread of the connection to the external pipes and screw the lines of the external system to the lines of the unit respecting the designation at the unit.

**If any seals are missing, these must only be replaced by glycol-resistant rubber seals.**

Fill and bleed air from the cooling water circuit by means of the filling connections and the schrader valves for bleeding (see refrigerant diagram).
6.3.5 Condensate drain connections

**Syphon installation**

Ensure that there is a sufficient height difference between the fan pan and the upper bow of the syphon or the highest part of the drain tube, in order to avoid a water column in the drain syphon caused by the pressure in the suction area of the A/C unit, which prevents the draining of the condensate water.

![Diagram of syphon installation](image)

Example: Static pressure in the suction area: -300Pa

\[
h = \frac{p}{\rho \cdot g}
\]

\[
h = \frac{-300Pa}{(1000kg/m^3 \cdot 10m/s^2)}
\]

\[
h = -3\text{ cm}
\]

If the height \( h \) is smaller than 3 cm with a pressure of 300 Pa in the suction area, a water column rests in the drain, the water is not transported and fills the fan pan. This water can be drawn dropwise in the fan or can drop out of the unit if the pan is full.

Connect the condensate water drains to the local waste water system.

**Comply with the regulations of the local water supply authority.**

On the A/C units the plastic grommet and the syphon are included in the unit as a supplementary pack.
6.4 Electrical connection

Ensure that the electric cables are de-energized.
The electric cables are only to be connected by an authorised specialist.
The unit must dispose of an effective earthing.

The power supply system on site and the pre-fuses must be designed for the total current of the unit (see technical data).

Route the electric cable into the electrics box from below and connect the three phases to the main switch, the PE conductor at the PE rail and the neutral conductor at the neutral terminal, in accordance with the wiring diagram (part of the unit documents) and secure these cables by the pull relief screws.

Make sure that the phase rotation is correct, the rotating field must turn right!

The scroll compressor and the fan are dependent on correct phase rotation. The sense of rotation will be checked at the factory before dispatch. On site, if the rotating field of the compressor is incorrect, it must be corrected by changing two phases of the power supply at the isolator. An inverse rotating field can be detected by a raised compressor noise level and results in overheating and destruction of the compressor after several hours of operation.

For use of leakage-current (Fl) circuit breakers, EN 50178 5.2.11.2 must be taken into account. Only type B pulse-current Fl circuit breakers are permitted. Fl circuit breakers do not provide protection against bodily harm during operation of the unit or frequency converters.

Make sure that the power supply corresponds to the indications on the rating plate and that the tolerances according to the “Application limits” are not exceeded. In addition to this, the asymmetry of phase between the conductors may amount to 2% maximally. The asymmetry of phase is determined by measuring the voltage difference between the phase conductors. The average value of the voltage differences may not exceed 8 V.
7. Commissioning

The unit must be installed and connected in accordance with the chapter on "installation" before initial commissioning.

- Open the electrical compartment door of the unit using the key provided.
- Make sure that the master switch is off and the unit is de-energized.
- Check whether all power switches and control-circuit fuses in the electrical section of the unit are switched off.
- Retighten all screw connections in the electrical cabinet.
- Verify the smooth function of the contactors.

Do not turn the adjustment screw beyond the end of the calibrated scale range, as it may result in overheating and short-circuit at the consumer.

- Adjustment of the power switches according to the electrical data sheet.
- Switch on the A/C unit at the master switch.
- Switch on the control-circuit fuses and the power switches of the fan and the compressor in sequence.

The controller is now supplied with power, so you can use it for adjustments.

Make sure that the heat rejecting system is operating.
- A - air-cooled condenser
- G - dry cooler

Switching on power switch
• Adjust the desired return air temperature at the controller.
• Start the A/C unit by pressing the Start/Stop-key on the controller.
• Check after 20 minutes operation, whether bubbles are visible in the sight glass of the liquid line. If this is the case, refrigerant might have escaped by a leak. Check the circuit on leaks, eliminate these and top up the circuit with R407C in regard of the chapter "Maintenance".
• Check the oil level at the compressor in respect of the right level.
  The oil level should be between the lower quarter and the middle of the sight glass.
• Check the current consumption of the compressors and the fans comparing it with the values of the technical data.
• Instruct the operational staff of the controller manipulation (refer to the controller manual).
8. Maintenance

8.1 Safety instructions

All maintenance work is to be carried out under strict compliance with the country-specific accident prevention regulations. In particular we refer to the accident prevention regulations for electrical installations, refrigerating machines and equipment. Non-compliance with the safety instructions can endanger people and the environment.

Maintenance work is only to be carried out on the units by authorized and qualified specialist staff.

**Procedure instructions**

Work on the system must always only be carried out when it is shut down. To do this, the unit must be switched off at the controller and at the master switch. A „DO NOT SWITCH ON“ warning sign must be displayed.

Live electrical components are to be switched to de-energized and checked to ensure that they are in the de-energized state.

Some verifications must be effected with the unit in operation (measuring the current, pressures, temperatures). In such a case the unit must only be switched on at the master switch after all mechanical connections have been carried out. The unit must be switched off immediately after the measuring procedure.

**Warning notes!**

When the master switch is switched on and the controller is stopped the power contactors are live, even if the components are not operating.

The fans have an operation delay after the unit is stopped ! (Risk of injury)

8.2 Maintenance intervals

<table>
<thead>
<tr>
<th>Component</th>
<th>Maintenance interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>monthly</td>
</tr>
<tr>
<td>Refrigerant circ.</td>
<td></td>
</tr>
<tr>
<td>Refrigerant charge</td>
<td></td>
</tr>
<tr>
<td>HP/LP switch</td>
<td></td>
</tr>
<tr>
<td>Sight glass</td>
<td></td>
</tr>
<tr>
<td>Compressor</td>
<td></td>
</tr>
<tr>
<td>Expansion valve</td>
<td></td>
</tr>
<tr>
<td>Air circuit</td>
<td></td>
</tr>
<tr>
<td>Heat exchanger</td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
</tr>
<tr>
<td>Pre-filter</td>
<td></td>
</tr>
<tr>
<td>Water circuit</td>
<td>x</td>
</tr>
<tr>
<td>Tightness</td>
<td></td>
</tr>
<tr>
<td>Condenser</td>
<td></td>
</tr>
<tr>
<td>Unit in general</td>
<td></td>
</tr>
<tr>
<td>Electrics</td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td>x</td>
</tr>
</tbody>
</table>

E/1007/28/53
8.3 Refrigerant circuit

Refrigerant charge - Quantity and Purity

**Quantity** - Check the **sight glass** and the **LP switch**.
An unsufficient charge causes the formation of bubbles in the sight glass or in extreme cases the triggering of the LP-switch. An operation with an insufficient refrigerant quantity over a longer period leads to a reduction of cooling capacity and to high superheating temperatures, which have a disadvantageous effect on the compressor lifetime.

If a leak is detected:

- let out the refrigerant in a collecting device down to a pressure of 1 bar\(_{\text{absolut}}\)
- connect a vacuum pump via a pressure gauge station on the high and low pressure side
- extract the refrigerant by the vacuum pump (not by the compressor!) to approx. 0 bar\(_{\text{absolut}}\)
- dispose the refrigerant according to the national regulations
- fill the circuit with nitrogen to 1 bar\(_{\text{absolut}}\)
- repair the leak
- the circuit has to be run dry by several (at least 3x) fillings and extractings of nitrogen, eventually change the filter drier.
- fill with R407C according to weight (see technical data)

*R407C must be charged in a liquid state, in order that the composition of the refrigerant does not change.*

**Quantity** - Check the **HP switch**
An overfilling of the circuit makes the condensation pressure rise and by that the power consumption of the compressor. In the extreme the HP-switch triggers.

**Purity** - Check the **sight glass** and the **filter drier**.
Bubbles in the sight glass indicate that the charge is unsufficient or that the filter drier is clogged.
A pollution of the filter drier, whose origin task is to clear the refrigerant from impurities and humidity, can be detected by a temperature difference upstream and downstream the filter drier.

Compare the colour indicator in the centre of the sight glass with the outer ring scale.

- purple to blue ---> ok.
- rose to red ---> humidity critical.

With too much humidity in the circuit, the expansion valve can freeze. In addition to this the ester oil in the compressor, which comes in touch with the refrigerant, takes up humidity and loses its ability to lubricate. In this case the refrigerant must be completely evacuated and recharged according to the above described evacuation instruction.

---

**Sight glass**
Compressor
In the compressor there is an ester oil charge, which does not have to be renewed under normal operation conditions and holds out for the unit's lifetime. However, it is possible that the ester oil, as it reacts hygroscopically, has taken up humidity of the air after repeated recharging of the refrigerant circuit due to repair works. The interaction between ester oil and water results in the formation of acid. Owing to a hyperacidity, corrosive processes take place inside the compressor. In this case the ester oil should be exchanged. The oil level can be checked by looking at the sight glass of the compressor.

Expansion valve
The refrigerant circuit is equipped with a thermostatic expansion valve with pressure compensation line, which controls the superheating in the evaporator. The superheating is adjusted to 7 K at the factory and may not be modified. The expansion valve can freeze, if the humidity in the system is excessive.

Do not thaw by soldering flame, danger of explosion! Thaw with moist warm cloth. Check the sight glass.

8.4 Air circuit

Heat exchanger (Evaporator)
The heat exchanger consists of copper tubes with aluminium fins. If refrigerant leaks occur, they should be searched for at the heat exchanger. Beyond that, the heat exchanger is exposed to the air pollution, the particles of which settle at the fins and reduce the heat transmission the same as raise the air resistance. The latter shows when the fan current increases. The heat exchanger can be cleaned by pressurized air which has to be blown opposite to the normal air flow direction along the fins.

Do not distort the fins while cleaning, this also increases the air resistance!

Fan
The bearings of the fans are lifetime lubricated and do not need maintenance. Check the operation current. An increased operation current indicates either a higher air resistance by a clogged pre-filter or a winding short circuit in the fan motor. You will find further notes for the fan maintenance and exchanging the V-belt on the next pages.

Air filter
A filter monitor controls the state of the filter. As soon as the pressure loss exceeds an adjustable value, a filter alarm via the controller is released. The controller can be configured such as to compensate the pressure loss by a higher fan speed, however you should not wait too long for exchanging the filter. The filters can be accessed by the front doors. The clogged filter elements can not by cleaned with pressurized air, as the filter structure would be destroyed otherwise. When you re-install the filter elements after the exchange, take care that the side with the coloured mark (dirt side) is turned away from the heat exchanger.
Checking fan for satisfactory condition

- Switch off the A/C unit at the controller.
- Attach a "DO NOT SWITCH ON" warning sign to the A/C unit.
- Wait until the fan stands still.
- Open the electrical compartment of the A/C unit using the STULZ door opener.
- Switch off the A/C unit at the master switch.
- Switch off the power switch of the fan.
- Open the air section doors.
- Check fan for damage, corrosion and firm seating.
- Turn the fan by hand, checking ease of movement and noting any running noises from the bearings.
- Check the V-belt for wear and replace it, if necessary.

- Check whether the pulleys of the V-belt align.
- Check the tension of the V-belt.

The V-belt may yield by a maximum of one V-belt thickness. The V-belt tension is adjusted by turning the hexagon shaft on the motor slide.

- Close the air section doors.
- Switch on the power switch of the fan.
- Switch on the master switch and close the electrical compartment.
- Remove the warning sign and put the A/C unit into operation.
Replacing V-belt

- Switch off the A/C unit at the controller.
- Attach a “DO NOT SWITCH ON” warning sign to the A/C unit.
- Open the electrical compartment door of the A/C unit.
- Switch off the A/C unit at the master switch.
- Wait until the fan stands still.
- Open the air section doors.
- Check the fan by hand for ease of operation.
- Loosen the V-belt by turning the shaft on the motor slide.
- Replace the V-belt.
- Tension the V-belt by turning the shaft on the motor slide.
- Check the tension of the V-belt.

**The V-belt may yield by a maximum of one V-belt thickness.**

- Check whether the pulleys align.

**Remove all tools and repair equipment in the A/C unit.**

- Switch on the A/C unit at the master switch.

**Caution: Do not reach into the fan when the fan wheel is running.**

! **Caution: rotating parts. Do not reach into the V-belt when it is in operation.**

**Caution: Current-conducting cables and electrical components of the A/C unit are live**

- Switch on the A/C unit at the controller.
- Check the fan for satisfactory function. Pay particular attention to running noises from the fan and bearings.
- Switch off the A/C unit at the controller.
- Close the air section doors.
- Close the electrical compartment door of the A/C unit.
- Remove the warning sign and put the A/C unit into operation.
8.5 Water circuit

Tightness
Check the water circuit visually for tightness. Beyond that a level indication at the storage tank, if existant, can give information about changes of the water quantity. A lack of water in the circuit is replaced by air, which reduces the heat capacity of the chilled water circuit and is detrimental to the pump.

Condenser (only at G)
Check the water side pollution of the plate condenser by comparing the cooling water inlet temperature to the outlet temperature. If the difference is less than 3 K, it indicates a limited heat transmission and thus pollution.
Another possibility to verify this consists in the comparison of the outlet temperature with the medium condensation temperature (by measuring the condensation pressure at the high pressure side of the compressor). If this difference exceeds 7 K, the condenser is probably polluted.
In this case the condenser has to be cleaned chemically.

8.6 Unit in general

Electrics
Check the connection terminals for tight fixation when the unit is installed and once again after an operation time of 30 days.

Mechanics
Clean the unit's inside with a vacuum cleaner. Clean pipes simplify the search for leaks. Check the pipes, the compressor and the condenser for a tight seat. Vibrations of pipes and circuit components can result in leaks. Check also the insulation of the water piping. Condensing air humidity on cold water pipes means a loss of cooling capacity.

8.7 Competences

| Repairs on the refrigerant circuit (tightness, filter drier exchange) | trained refrigeration technician |
| Repairs on the main components of the refrigerant circuit (compressor, expansion valve, condenser, evaporator) | Stulz service technician |
| Repairs on the water circuit (tightness) | trained refrigeration technician |
| Repairs on the electrics | trained electrician |
9. Dismantling and disposal

The A/C unit can only be dismantled by qualified specialists.

Switch off the A/C unit at the controller and at the master switch. Switch off power conducting cables to the unit and secure them against being switched on again. Disconnect the A/C unit from the de-energized network.

Dispose of the refrigerant in the unit in accordance with the disposal and safety regulations applicable on site.

The refrigerant may not be discharged into the atmosphere, but must be returned to the manufacturer, if it is not reused.

The ester oil in the compressor must also be disposed. As it contains dissolved refrigerant, it can not be disposed like usual oils, but must be returned to the oil manufacturer.

Disconnect the depressurized refrigerant pipes from the external system (version A).

If glycol or similar additives had been used, this liquid also has to be collected and disposed in an appropriate manner and may under no circumstances be introduced in the local waste water system.

Disconnect the unit from the external water circuit by closing the shut-off valves and drain the water circuit of the unit (version G).

Disconnect the depressurized cooling water pipes of the unit from the external system.

Move the unit, as described in the chapter "transport", with a lifting device of sufficient load-carrying capacity.

Dispose of the A/C unit in accordance with the disposal and safety regulations applicable on site. We recommend a recycling company for this. The unit basically contains the raw materials aluminium (heat exchanger), copper (pipelines, wiring), and iron (condenser, panelling, mounting panel).
10. Options

10.1 Steam humidifier

The steam humidifier is an optional extra for your A/C unit. It is installed complete and integrated within the function and method of operation of the A/C unit. Details concerning the connection assignment for the power supply can be found in the electrical diagrams in the appendix.

We recommend the installation of an Aqua-stop valve in the water supply of the humidifier. In addition to this, the room, in which the A/C unit with the humidifier is installed, should be equipped with a water detection system.

10.1.1 Description

The humidifier uses normal mains water for the production of steam. The conductivity of the water should be within the range of min. 300 to max. 1250 µS/cm. The water is converted directly into steam by means of electrical energy in a steam cylinder with electrode heating. The steam is introduced into the airflow via the steam throttle.

Due to the evaporation the water level in the cylinder falls. The current consumption is reduced, as the electrodes are then immersed less in the water. With a sinking water level the mineral concentration in the cylinder increases, as the minerals do not evaporate. The current is kept by the control between two limit values (I\text{N+10%}, I\text{N-5%}). When the lower limit value is reached, the inlet valve opens. Now fresh water is mixed with residual water, which has a high mineral concentration. After several evaporation and filling cycles, the mineral concentration has increased in such a way, that the current reduction due to evaporation and falling water level takes place quite rapidly. When a certain limit value of current reduction is exceeded, the drain valve is opened at the moment, when also the lower current limit value is reached, and finally the cylinder is completely drained.

The filling phase is automatically interrupted if the sensor electrode is contacted due to the high water level in the steam cylinder. This may happen in the start-up phase with a new steam cylinder.

10.1.2 Technical data

Four different sizes of humidifier are installed in STULZ A/C units. You can see which humidifier is installed in your unit from the following table.

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidifying capacity kg/h</td>
<td>5</td>
<td>5/8</td>
<td>5/8/10/15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Steam humidifier

<table>
<thead>
<tr>
<th>Hum. capacity [kg/h]</th>
<th>Nom. current [A]</th>
<th>Nom. power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5,4</td>
<td>3,75</td>
</tr>
<tr>
<td>8</td>
<td>8,7</td>
<td>6,0</td>
</tr>
<tr>
<td>10</td>
<td>10,8</td>
<td>7,5</td>
</tr>
<tr>
<td>15</td>
<td>16,2</td>
<td>11,25</td>
</tr>
</tbody>
</table>
Supply water - application limits

<table>
<thead>
<tr>
<th>Temperature</th>
<th>max. 40°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>1 - 8 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water properties and ingredients</th>
<th>min</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydrogen ions</td>
<td>7</td>
<td>8,5</td>
</tr>
<tr>
<td>specific conductivity (at 20°C)</td>
<td>$\sigma_{20^\circ C}$</td>
<td>µS/cm 300</td>
</tr>
<tr>
<td>total dissolved solids</td>
<td>TDS</td>
<td>mg/l</td>
</tr>
<tr>
<td>dry residue at 180°C</td>
<td>$R_{180}$</td>
<td>mg/l</td>
</tr>
<tr>
<td>total hardness</td>
<td>mg/l $\text{CaCO}_3$</td>
<td>100²</td>
</tr>
<tr>
<td>iron + manganese</td>
<td>mg/l $\text{Fe} + \text{Mn}$</td>
<td>0</td>
</tr>
<tr>
<td>chlorides</td>
<td>ppm Cl</td>
<td>0</td>
</tr>
<tr>
<td>silica</td>
<td>mg/l $\text{SiO}_2$</td>
<td>0</td>
</tr>
<tr>
<td>residual chlorine</td>
<td>mg/l $\text{Cl}^-$</td>
<td>0</td>
</tr>
<tr>
<td>calcium sulphate</td>
<td>mg/l $\text{CaSO}_4$</td>
<td>0</td>
</tr>
<tr>
<td>metallic impurities</td>
<td>mg/l</td>
<td>0</td>
</tr>
<tr>
<td>solvents, diluents, soaps, lubricants</td>
<td>mg/l</td>
<td>0</td>
</tr>
</tbody>
</table>

* values depending on specific conductivity; in general: $\text{TDS} \equiv 0,93 \times \sigma_{20}; \ R_{180} \equiv 0,65 \times \sigma_{20}$

² not lower than 200% of chlorides content in mg/l of Cl⁻

10.1.3 Supply connections

The steam humidifier is installed and electrically connected in the A/C unit. The local regulations of the water supply company are to be complied with when making the hydraulic connection.

Water supply

The water connection is made from the cold water mains and is to be equipped with a shut-off valve. It is recommended to install a filter to retain solid particles of pollution. The humidifier can be connected directly to the mains by a threaded tenon of 3/4" when the water pressure is between 1 and 8 bar. The pipe should have a diameter of at least 6 mm. If the line pressure is more than 8 bar, the connection must be made via a pressure reducing valve (set to 4-6 bar). In each case it is to be ensured that the manufactured water pipe upstream of the connection to the humidifier is flushed properly. We recommend only using copper pipes. The water supply temperature must not exceed 40°C.

Do not treat the water with softeners!

This could result in corrosion of the electrodes and in the formation of foam with considerable operational interruptions.

Prevent:
1. the use of well water, process water or water of cooling circuits and generally chemically or bacteriologically polluted water;
2. the addition of disinfectants or anti-corrosion liquids, as these are very irritating for the respiratory ducts.
**Water drain**
The drain is achieved by a plastic hose and is routed out of the unit by means of the openings in the unit provided for this purpose (refer to 6.3.1 pipe entrance area). When creating the drain, attention is to be paid to provision for cleaning. As the water drain is depressurized, we recommend routing the drain hose directly into an open collector funnel to ensure free discharge. The drainage pipe should be routed to the sewerage system with sufficient gradient (at least 5%) and should be located approx. 30 cm below the humidifier. Attention is to be paid to temperature resistance when plastic pipes are used. If copper pipe is used, it must be earthed. For the drainage pipe an inside diameter of 32 mm is recommended, however the minimum inside diameter should not be less than 25 mm.

**10.1.4 Commissioning**
As soon as the controller requires the humidifier function, the heating current is switched on; after approx. 30 seconds water is fed into the steam cylinder through the inlet valve which opens and fully automatic operation begins. A condition is the open shut-off valve in the water supply.

**IMPORTANT NOTICE:**
After the water pipes have been connected, the supply piping must be flushed for approx. 30 minutes, where the water is directly conducted into the drain, without letting it flow into the steam humidifier. This way residues or substances of the installation process are removed, which otherwise could block the fill valve and cause foam during the boiling process.

**Decommissioning the humidifier**
The steam cylinder is to be emptied if the humidifier has been out of operation for a longer period (e.g. in summer, decommissioning the air conditioning system etc.) (see 10.1.6 Maintenance - Drainage).
10.1.5 Operation

The steam humidifier is controlled and monitored by the controller. No further operating measures are required for continuous operation. However, you can always vary the humidifier output, by operating the DIP-switches A3/4, which are located on the humidifier printed circuit board in the electrical section of the A/C unit.

The humidifier operation is indicated by a green LED. From the yellow LED you can see the state of operation of the humidifier (see diagram 1,2). The red LED indicates if an alarm is active (see alarm table). You can also manually drain the steam cylinder (see 10.1.6 Maintenance). The position of the TA RATE-switches 1-4, the DIP-switches A2 and B2 is not to be changed under no circumstances. For this reason the switches are sealed.

**Power supply 24 VAC**

**G/G0**

**Manual drainage**

**Drain valve**

**Fill valve**

**High level/foam sensor**

**Conductivity sensor**

**External TAM**

**Immersed electrodes**

**Max. 5A**

**Alarm relay**

**Remote ON/OFF**

**HS45**

**Humidity sensor**

**External controller**

**Fig. 1**

DIP A2: Alarm relay status

- Relay energized (contact closed), when at least 1 alarm is active, otherwise not energized (contact open).

DIP A5-6: Adjustment of the inactivity period, after which the cylinder is completely drained.

- Relay not energized (contact open), when at least 1 alarm is active, otherwise energized (contact closed).

- DIP A5: 3 days
- DIP A6: 2 days
- DIP A5: 3 days
- DIP A6: 7 days
DIP-switch B1 : Setting of the hour counter and maintenance alarm

OFF (default): hour counter and maintenance alarm enabled

ON: hour counter and maintenance alarm disabled (only if the DIP-switch B1 is already ON before switching on the humidifier board).

Maintenance warning
After 2000 humidifier operating hours a warning is released, which is indicated by a flashing red LED (7 short flashes) and the intermittent activation of the alarm relay (only if no other alarms are active). The alarm indicates the need for a cylinder maintenance. However, the humidifier operation is still possible.

Maintenance alarm
After 3000 operating hours an alarm is released, which is indicated by a flashing red LED (8 short flashes) and the steady activation of the alarm relay. The alarm indicates the necessary exchange of the steam cylinder. The humidifier operation is blocked.

Reset of the hour counter and the alarms
1. Set DIP-switch B1 to ON, after 5 seconds the alarm LED (red) and the operation LED (yellow) lights up for 3 seconds (the alarms are still active and the hour counter is still in operation).

2. Set DIP-switch B1 to OFF, the hour counter starts from 0, the alarms are cancelled. The humidifier operation is enabled again.

Notice for counting the operating hours
The counting of the operating hours is proportional to the steam production, because the amount of lime accumulating in the cylinder (as a criterion for the cylinder exchange) depends on the steam production. Example:
After 100 operating hours with 100% steam production the hour counter has saved 100 hours.
After 100 operating hours with 75% steam production the hour counter has saved 75 hours.
DIP-switch B2-8: Auxiliary functions and automatic drain timings

DIP B2: automatic drainage with electrodes powered/not powered
ON: electrodes powered during automatic drainage
OFF (default): electrodes not powered

DIP B3: automatic drainage when request is reduced by at least 25%.
ON: new humidification capacity achieved by steam cycles
OFF (default):
1. new humidification capacity is achieved by steam cycles, if the request is reduced by less than 25%.
2. automatic drainage, if the request is reduced by at least 25%

DIP B4: disabling of the pre-alarm and the warning for wornout cylinder (see alarm table 2)
ON: warnings are never displayed.
OFF (default): warnings are displayed when the cylinder is worn out.

DIP B5-6: automatic drainage time

<table>
<thead>
<tr>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

- time = default
- time = default - 30%
- time = default + 33%
- time = default + 66%

DIP B7-8: evaporation time threshold

<table>
<thead>
<tr>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

- threshold = default
- threshold = default - 30%
- threshold = default + 33%
- threshold = default + 66%

Change the default adjustment only after confirmation of the STULZ technical support. The dip-switches serve to adapt the drain cycle to extreme water conditions beyond the previously described limit values.
The yellow LED stays off when no steam is produced, whereas it stays continuously on at 100% of the nominal production.

When steam is being produced at a transient production rate while approaching the steady-state production, the yellow LED is quickly turned on and off to produce 2 Hz-pulse sequences which are related to the actual steam production as shown in diagram 1.

When the steady-state production is achieved, the yellow LED is slowly turned on and off to produce 0.5 Hz-pulse sequences which are related to the actual steam production as shown in diagram 2.

Each pulse sequence is separated from the following by a 3-second delay, so that the user can count the pulse number of a sequence and determine, using the diagram, the actual humidification capacity.
10.1.6 Maintenance

Please switch off the A/C unit at the controller and the main isolator before starting work and put the power circuit breaker F70 in the electrical box to position 0!

The following work and checks can be carried out:
- check steam hoses, condensate hoses, water hoses and other parts of the humidifier for external effects or wear.
- Flush out the water drain.

Replacing the steam cylinder
The steam cylinder needs replacing if the electrodes are so highly insulated due to the increasing calcification or furring that the water level in the steam cylinder constantly touches the sensor electrode.
The specially constructed water filling beaker provides additional safety here, excessive water being routed to an overflow and being able to drain away there.

Warning note!
The temperature of the discharged water is approx. 60°C during normal operation but can reach 100°C briefly, if the steam cylinder is emptied manually during maintenance work.

The steam cylinder should be allowed to cool down slightly before removal.
If the alarm code 11x long on the humidifier printed circuit board in the electrical section (also refer to Alarm table 2) occurs repeatedly, the steam cylinder has worn out and must be replaced. The life of a steam cylinder depends on the operating period and the hardness of the water.

Manual drainage
By means of a switch on the humidifier board, you can manually drain the cylinder. After the drainage the switch must be reset to position "ON", otherwise no humidification can take place.

Switch off the power supply circuits to the humidifier before continuing the work!

The steam cylinder can be unscrewed from the mount after releasing the hose clamp, pulling off the steam hose and disconnecting the electrical plug on the cylinder.
The new steam cylinder is installed in the reverse sequence. The humidifier is re-started in accordance with the recommendations of the chapter “10.1.4 Commissioning”.

Position "ON"  Position "DR"
10.1.7 Malfunction causes / Remedy

Alarm: Humidifier defect

The humidifier alarm is received by the controller and can be requested according to the equipment.

C7000-control system: no display (display only externally)
C7000 plus-terminal: indication on the display
C7000 advanced terminal: indication on the display

In the event of this signal on the controller, please look for the exact cause of the fault on the humidifier printed circuit board in the electrical section of the A/C unit. If an alarm has been raised, the red light-emitting diode displays a flashing alarm code. The meaning of the alarm codes can be seen in the alarm table.

Diagram 3: Alarms: red LED - "short flashing"

Diagram 4: Alarms: red LED - "long flashing"
**Alarm list**

**Table 1 - Alarm types**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Reset (if alarm cause has been removed)</th>
<th>Red LED</th>
<th>Alarm relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking</td>
<td>CP-card stops humidifier.</td>
<td>manual: to restart, turn the cp-card off and then on again.</td>
<td></td>
<td>The relay is normally open or normally close depending on DIP A2.</td>
</tr>
</tbody>
</table>
| Disabling| CP-card stops humidifier.                       | • automatic  
• manual: to restart, turn the cp-card off and then on again. | Alarm codes: each code is displayed in sequence. | The relay action is cumulative:  
• contact is closed (opened), if at least 1 alarm is active.  
• contact is opened (closed), if:  
- all alarm causes have been removed.  
- all alarms have been reset, either manually or automatically.  
Note: each alarm is not assigned to the relay (see table below) |
| Warning  | CP-card does not stop humidifier.                | • automatic                                              |                                                 | Note: each alarm is not assigned to the relay (see table below) |

**Table 2 - Alarms**

<table>
<thead>
<tr>
<th>Red LED flashes</th>
<th>Description &amp; Causes</th>
<th>Remedy</th>
<th>Type</th>
<th>Reset</th>
<th>Alarm relay</th>
</tr>
</thead>
</table>
| 2xshort         | Electrode over-current  
1. water conductivity too high (usually when starting after a short stop)  
2. high water level due to drain valve malfunction  
3. high water level due to fill valve leakage  
4. electrode malfunction | 1. Drain part of the water and re-start.  
2. Verify that the drain valve is properly working.  
3. Check for any leakage of the fill valve when the humidifier is switched off. | blocking | manual   | active      |
| 3xshort         | No voltage at the electrodes: with the unit on, no steam is produced.             | 1. Check the external command signal: type (V or mA)? Value? Connections?  
2. Switch off the unit and disconnect it from the mains: check the internal electrical connections. | blocking | manual   | active      |
| 4xshort         | Internal memory error                                                              | 1. Download the proper default configuration via HumiSet.  
2. If the problem persists, contact the STULZ customer service. | blocking | manual   | active      |
| 5xshort         | High conductivity of the supply water                                               | 1. Switch off the unit and clean the conductivity sensor electrodes;  
2. If the problem persists, change the source of supply water or install a suitable treatment system (demineralisation, even partial).  
Note: the problem will not be solved by softening the supply water. | blocking | manual   | active      |
### Table 2 - Alarms (continued)

<table>
<thead>
<tr>
<th>Red LED flashes</th>
<th>Description &amp; Causes</th>
<th>Remedy</th>
<th>Type</th>
<th>Reset</th>
<th>Alarm-relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x long</td>
<td>Cylinder depleted</td>
<td>Do maintenance and/or replace the cylinder.</td>
<td>warning</td>
<td>manual</td>
<td>not active</td>
</tr>
<tr>
<td>3x long</td>
<td>Lack of supply water</td>
<td>1. Check that the fill pipe from the mains to the humidifier and the internal pipe are not blocked or bent and that there is sufficient supply pressure (1-8 bar).&lt;br&gt;2. Check that the fill valve is properly working.&lt;br&gt;3. Check whether the counter-pressure onto the steam hose is higher than the maximum limit, preventing the entry of supply water into the cylinder by gravity.&lt;br&gt;4. Check that the steam outlet pipe is not choked and that there is no condensate inside.</td>
<td>disabling</td>
<td>manual</td>
<td>active</td>
</tr>
<tr>
<td>4x long</td>
<td>Excessive reduction of steam production</td>
<td>1. Cylinder completely depleted or excessive foam. Do maintenance to the cylinder.</td>
<td>disabling</td>
<td>manual</td>
<td>active</td>
</tr>
<tr>
<td>5x long</td>
<td>Drain malfunction</td>
<td>1. Check the drain circuit and the proper operation of the drain valve.</td>
<td>disabling</td>
<td>manual</td>
<td>active</td>
</tr>
<tr>
<td>6x long</td>
<td>User parameter error</td>
<td>1. Download the proper default configuration via HumiSet.&lt;br&gt;2. If the problem persists, contact the STULZ customer service.</td>
<td>blocking</td>
<td>manual</td>
<td>active</td>
</tr>
<tr>
<td>7x long</td>
<td>Supply water high conductivity pre-alarm</td>
<td>1. Check the conductivity of the supply water.&lt;br&gt;2. If necessary install a suitable demineralizer.&lt;br&gt;Note: the problem will not be solved by softening the supply water.</td>
<td>warning</td>
<td>display: automatic reset</td>
<td>not active</td>
</tr>
<tr>
<td>8x long</td>
<td>External command signal not properly connected (only 2/10V)</td>
<td>1. Check the connection to the (external) controller.</td>
<td>disabling</td>
<td>alarm: automat.</td>
<td>active</td>
</tr>
<tr>
<td>9x long</td>
<td>Cylinder full with steam production not in progress</td>
<td>with the humidifier switched off:&lt;br&gt;1. Check for any leaks from the fill valve or the condensate return pipe.&lt;br&gt;2. Check that the level sensors are clean.</td>
<td>disabling</td>
<td>manual</td>
<td>active</td>
</tr>
<tr>
<td>10xlong</td>
<td>Foam inside the cylinder</td>
<td>Foam is usually caused by surfactants in the water (lubricants, solvents, detergents, water treatment agents, softeners) or an excessive concentration of dissolved salts:&lt;br&gt;1. Drain and clean the water supply pipes.&lt;br&gt;2. Clean the cylinder.&lt;br&gt;3. Check for the presence of softeners. (in this case, use another type of supply water or reduce the softening) Do maintenance and/or replace the cylinder.</td>
<td>warning</td>
<td>display: manual reset</td>
<td>not active</td>
</tr>
<tr>
<td>11xlong</td>
<td>Cylinder almost completely depleted</td>
<td></td>
<td>warning</td>
<td>display: manual reset</td>
<td>not active</td>
</tr>
</tbody>
</table>

**Note:** "manual reset" means one of the following activities<br>- pulling off and putting on the power supply plug G/G0 (see 10.1.5 operation - fig. 1)<br>- switching off and on the control fuses F02 (Caution: unit is switched off.)
10.2 Reheat

The reheat is an optional extra for your A/C unit. It is installed complete and integrated in the function and method of operation of the A/C unit. It is used to heat up the air. The following versions of the heater are available:

- Electrical reheat
- Hot water reheat (HW)
- Refrigerant reheat (RF)

Description

**Electrical reheat**

The reheat is connected in accordance with the electric diagram (refer to the appendix). It is controlled and monitored by the controller. The values for switching on and off are adjusted in the "operate module functions/heating" menu on the controller. Refer to the operating instructions C7000.

**HW reheat**

The HW reheat is to be connected to an external hot water circuit. The water supply is controlled via an electrically actuated HW valve. The HW valve is controlled via the controller. The control parameters are adjusted in the "operate module functions/heating/HW valve" menu on the controller. Refer to the operating instructions C7000.

**RF reheat**

The refrigerant reheat is integrated in the refrigerant circuit in accordance with the refrigerant diagram in the appendix. The refrigerant supply is controlled via an electrically-actuated 3-way solenoid valve. The solenoid valve is controlled via the controller. The control parameters are adjusted in the "operate/module functions/heating" menu on the controller. Refer to the operating instructions C7000.

Operation

The reheat is controlled and monitored by the controller. No further measures are required for operation.

Maintenance

Clean the reheat annually from contaminations and check it for damage.
Installation
The reheat is installed and connected in the A/C unit. The HW reheat is to be connected on site to the external hot water circuit. The pipelines are to be routed out of the A/C unit. The diameters for the connection piping of the HW reheat are listed in the following table.

Technical data concerning the HW Reheat

<table>
<thead>
<tr>
<th>Temperatures:</th>
<th>Glycol: 0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water inlet:</td>
<td>60°C</td>
</tr>
<tr>
<td>Water outlet:</td>
<td>40°C</td>
</tr>
<tr>
<td>Air inlet:</td>
<td>13°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe - Ø [mm]</td>
<td>16</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>171</th>
<th>201</th>
<th>271</th>
<th>301</th>
<th>351</th>
<th>431</th>
<th>521</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating capacity kW</td>
<td>12,6</td>
<td>13,5</td>
<td>20,2</td>
<td>20,4</td>
<td>21,9</td>
<td>23,0</td>
<td>24,2</td>
</tr>
<tr>
<td>Air flow m³/h</td>
<td>5500</td>
<td>6500</td>
<td>8300</td>
<td>8500</td>
<td>10000</td>
<td>12800</td>
<td>14000</td>
</tr>
<tr>
<td>Water flow m³/h</td>
<td>0,54</td>
<td>0,59</td>
<td>0,88</td>
<td>0,89</td>
<td>0,95</td>
<td>1,00</td>
<td>1,05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>352</th>
<th>442</th>
<th>542</th>
<th>602</th>
<th>652</th>
<th>702</th>
<th>852</th>
<th>1052</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating capacity kW</td>
<td>20,1</td>
<td>22,1</td>
<td>24,6</td>
<td>33,3</td>
<td>34,5</td>
<td>36,5</td>
<td>39,1</td>
<td>42,0</td>
</tr>
<tr>
<td>Air flow m³/h</td>
<td>10000</td>
<td>11900</td>
<td>14500</td>
<td>17300</td>
<td>18000</td>
<td>18500</td>
<td>21000</td>
<td>24000</td>
</tr>
<tr>
<td>Water flow m³/h</td>
<td>0,87</td>
<td>0,96</td>
<td>1,07</td>
<td>1,45</td>
<td>1,50</td>
<td>1,59</td>
<td>1,70</td>
<td>1,82</td>
</tr>
</tbody>
</table>

Commissioning
The reheats are controlled and monitored by the controller of your A/C unit. No further measures are required for commissioning.

Malfunction causes
Alarm: Reheat defect

All reheat alarms are received by the controller and can be requested according to the equipment.

C7000-control system: no display (display only externally)
C7000 plus-terminal: indication on the display
C7000 advanced terminal: indication on the display
10.3 Raised floor stand

The floor stand is used to adjust the height of the A/C unit to the existing raised floor and consists of an encircling rectangular profile of galvanized steel with adjustable screw sockets. Anti vibration compound is recommended between concrete floor and base plate.

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (mm)</td>
<td>960</td>
<td>1360</td>
<td>1710</td>
<td>2110</td>
<td>2685</td>
</tr>
<tr>
<td>L1 (mm)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1370</td>
<td>500</td>
</tr>
<tr>
<td>L2 (mm)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1945</td>
</tr>
<tr>
<td>Supports (n°)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Rectangular profiles 70 x 40 (n°)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Mafund strips</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Screws M8 x 30</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>
Connecting the bars  (View from below)

Minimum distances and mounting instructions

- Please observe that the floor stand must be decoupled from the surrounding floor plates by damping insertions and that mafund plates are laid under the floor supports.

- The raised floor cutting (notch) should at least be 15° and must not have any contact to the raised floor stand, which could result in bone-conduction.

- If the floor stand is placed near a wall, a minimum distance of 50 mm should be respected. The gap between wall and floor stand should be closed by tin stripes.

- The dimensions of the openings in the raised floor (X and Y) are 10 mm longer than the raised floor stand. The joint must be closed by customers with a continuous seal.

- A concrete foundation is recommended in the area of the raised floor supports.

- The raised floor supports have to be installed on vibration dampening material (do not screw down the supports!).

- Prior to installation of the A/C unit, the raised floor must be installed 7 mm higher than the raised floor plates, as the mafund plates are compressed by the weight of the A/C unit.

General design of the raised floor stand
Detail of raised floor connection

Sealing detail when distance $Z < 100$ mm

Sealing detail when distance $Z \geq 100$ mm

Other mounting options (e.g. louvers)
If louvers shall be installed beneath the unit, these must be first mounted onto the adapter plate. If there are two or three louvers, the louver shafts are connected by a coupling piece. The louver actuator, which has to be installed on the shaft, will later be on the right unit side in the proximity of the electric cabinet.

Positioning of the A/C unit on the floor stand
When positioning the A/C unit on the floor stand, it must be brought precisely into the correct position above the floor stand from the front (under no circumstances diagonally). Hereby use mounting aids to bring in the unit and secure these by fixing belts. We recommend further to lay in advance at least two securing instruments (e.g. square steel bars) on the stand to avoid a slip-off. When the unit is in the right position the securing aids can be taken away and the unit can be set down. Now the mounting aids can be pulled away under the unit.

Other mounting options (e.g. louvers)
If louvers shall be installed beneath the unit, these must be first mounted onto the adapter plate. If there are two or three louvers, the louver shafts are connected by a coupling piece. The louver actuator, which has to be installed on the shaft, will later be on the right unit side in the proximity of the electric cabinet.

Positioning of the A/C unit on the floor stand
When positioning the A/C unit on the floor stand, it must be brought precisely into the correct position above the floor stand from the front (under no circumstances diagonally). Hereby use mounting aids to bring in the unit and secure these by fixing belts. We recommend further to lay in advance at least two securing instruments (e.g. square steel bars) on the stand to avoid a slip-off. When the unit is in the right position the securing aids can be taken away and the unit can be set down. Now the mounting aids can be pulled away under the unit.

Sealing detail when distance $Z < 100$ mm

Sealing detail when distance $Z \geq 100$ mm

Detail of raised floor connection

1. Raised floor stand
2. Adjustable support plate
3. Adjusting nut
4. Support pipe
5. Support base
6. Mafund strips
7. Raised floor cut out
8. Angle
9. Continuous seal profile
10. Before unit installation
11. Raised floor plate
12. Angled bracket
13. Permanently elastic sealFixing
10.4 Air side connection

10.4.1 Unit base
The unit base is available in the versions: open, with damper, with flexible connection or with supply grilles.

![Diagram of unit base]

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (mm)</td>
<td>960</td>
<td>1360</td>
<td>1710</td>
<td>2110</td>
<td>2685</td>
</tr>
<tr>
<td>B (mm)</td>
<td>80/130*</td>
<td>210</td>
<td>182</td>
<td>182</td>
<td>228</td>
</tr>
<tr>
<td>C (mm)</td>
<td>-</td>
<td>-</td>
<td>927</td>
<td>1127</td>
<td>1458</td>
</tr>
<tr>
<td>L1 (mm)</td>
<td>800/700*</td>
<td>1000</td>
<td>600</td>
<td>800</td>
<td>1000</td>
</tr>
</tbody>
</table>

* version with grilles

Caution! Each of the unit base versions must be screwed to the unit!

![Unit base with grilles]
Unit base with flexible connection

Unit base with damper
For the air side connection on top of the unit exist different options, which are designed as a simple ducting system (SDS), which means that they can be easily moved and put together on the installation site, a time-saving aspect.

**10.4.2 Duct**

The duct is available with two different heights (500 or 800 mm) for all down-/upflow units. The duct will be set on top of the unit and be screwed with the unit. A detailed assembly instruction is attached with the duct parts.

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (mm)</td>
<td>1000</td>
<td>1400</td>
<td>1750</td>
<td>2150</td>
<td>2725</td>
</tr>
<tr>
<td>C* (mm)</td>
<td>100</td>
<td>100</td>
<td>45</td>
<td>100</td>
<td>144</td>
</tr>
<tr>
<td>D* (mm)</td>
<td>-</td>
<td>-</td>
<td>905</td>
<td>1250</td>
<td>1581</td>
</tr>
<tr>
<td>L1* (mm)</td>
<td>800</td>
<td>1200</td>
<td>2 x 800</td>
<td>2 x 800</td>
<td>2 x 1000</td>
</tr>
</tbody>
</table>

*only for the discharge plenum (see next page)
10.4.3 Discharge plenum
The discharge plenum is available in two different versions for all down-/upflow units. The discharge plenum will be set on top of the unit and be screwed with the unit. A detailed assembly instruction is attached with the discharge plenum parts.

Discharge plenum with front grilles

Discharge plenum with front and side grilles

For numerical values of the dimensions B, C, D, L1 see table on the previous page. Only one front grille for sizes 1, 2.
10.4.4 Bag filter top
The bag filter is available for all downflow units. The bag filter serves for the pre-filtration of the air which is sucked in and can be obtained in the qualities F6, F7 and F9 (according to EN779). The bag filter top will be set on top of the unit and be screwed with the unit. A detailed assembly instruction is attached with the parts.

Cabinet size 1
pressure loss dependant on the airflow with different filter qualities

Cabinet size 2
pressure loss dependant on the airflow with different filter qualities
Cabinet size 3
pressure loss dependant on the airflow with different filter qualities

Cabinet size 4
pressure loss dependant on the airflow with different filter qualities

Cabinet size 6
pressure loss dependant on the airflow with different filter qualities
### 10.4.5 Sound insulation plenum

The sound insulation plenum is available for all downflow- and upflow units. The plenum will be set on top of the unit and be screwed with the unit. A detailed assembly instruction is attached with the parts. By the insertion of the sound absorbing material, a sound attenuation is caused, which is stated across the acoustic spectrum in octave divisions in the table below. The stated frequencies represent the middle frequencies of the octaves, to which the attenuation values relate (e.g. 500Hz for the octave from 375Hz to 750Hz).

**Height: 500 mm**

<table>
<thead>
<tr>
<th>Cab. size</th>
<th>$V_L$</th>
<th>$dp$</th>
<th>Insertion loss [dB] at octave middle frequency (according to VDI 2567)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$m^3/h$</td>
<td>Pa</td>
<td>63 Hz</td>
</tr>
<tr>
<td>1</td>
<td>7200</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>10200</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>13500</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>20500</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>24000</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

**Height: 800 mm**

<table>
<thead>
<tr>
<th>Cab. size</th>
<th>$V_L$</th>
<th>$dp$</th>
<th>Insertion loss [dB] at octave middle frequency (according to VDI 2567)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$m^3/h$</td>
<td>Pa</td>
<td>63 Hz</td>
</tr>
<tr>
<td>1</td>
<td>7200</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>10200</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>13500</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>20500</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>24000</td>
<td>22</td>
<td>2</td>
</tr>
</tbody>
</table>
10.4.6 Adapter plate with damper or flexible connection

- Downflow version

The adapter plate serves to attach a damper or a flexible connection on top of the unit or a duct. First install the actuator onto the louver shaft on the right side looking at the unit front. Then fix the louver with the actuator on the adapter plate. Now mount the adapter plate with pre-mounted louver on the unit top by means of a screw connection.

The damper actuator, which is controlled via a 24 V signal by the controller, has to be electrically connected. For this the cable, which is already connected at the motor, must be routed through an opening in the adapter plate into the unit and then be connected at the controller in the electric box according to the electric diagram.

If the air side has to be continued by a duct, the installation of a flexible connection is necessary. Please take into account the installation of pressure compensations in the flexible connection.

<table>
<thead>
<tr>
<th>Cabinet size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mm</td>
<td>1000</td>
<td>1400</td>
<td>1750</td>
<td>2150</td>
<td>2725</td>
</tr>
<tr>
<td>B mm</td>
<td>237</td>
<td>287</td>
<td>237</td>
<td>237</td>
<td>343</td>
</tr>
<tr>
<td>C mm</td>
<td>650</td>
<td>1000</td>
<td>1400</td>
<td>1800</td>
<td>2000</td>
</tr>
<tr>
<td>D mm</td>
<td>107</td>
<td>107</td>
<td>107</td>
<td>107</td>
<td>107</td>
</tr>
<tr>
<td>E mm</td>
<td>650</td>
<td>650</td>
<td>675</td>
<td>675</td>
<td>675</td>
</tr>
<tr>
<td>H mm</td>
<td>120</td>
<td>120</td>
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10.5 Electrical Options

10.5.1 Three phase control
The phase control module checks the presence of all phases. In case of a phase failure the module switches off the A/C unit and protects it from excessive currents on the existant phases this way. When the defective phase returns the unit is restarted automatically and does not have to be switched on manually. You can adjust a time at the phase control module within which a phase failure shall be detected as an error.
11. Customer service

STULZ customer service ensures optimum operating reliability by means of preventative maintenance and repair during the entire service life of your units. Customer service is available to you round the clock. You can contact our customer service at the STULZ branch responsible for you.

For your service address please look at the back cover of this manual.